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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Yanlong Shi

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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP

901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413

EXAMINER

ZIMMER, ANTHONY J

ART UNIT

PAPER NUMBER

1793

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/534,685	<b>Applicant(s)</b> SHI ET AL.	
	<b>Examiner</b> ANTHONY J. ZIMMER	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11 and 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-9 and 11-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 9 require catalyst portions having lightoff temperatures in a mixture of fuel, air and steam. The specification as originally filed does not provide support for the lightoff temperature being in a mixture of fuel, air, and steam.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 4-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Madgavkar '048.

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In regard to claims 1 and 5, Madgavkar teaches a catalyst system having two different catalysts in different catalyst zones (portions); the first catalyst zone (the upstream portion) consisting of a first catalyst with a lower lightoff temperature (higher amount of platinum); and the second catalyst zone consists of a second catalyst with a higher lightoff temperature (less platinum). See column 2, lines 27-55. Example 5 utilizes such a catalyst system, wherein the first zone has a platinum content of 0.5% and the second 0.3%. Example 4 characterizes these different catalysts as having a 50°C difference in lightoff temperature. The lightoff temperature is in a mixture of fuel, steam, and air because substoichiometric combustion (and all combustion for that matter) produces steam as a product and thus the lightoff temperature must be in a mixture of fuel, steam, and air.

The first and second catalysts meet the structural implications of the limitation that the catalysts are for converting a reactant mixture of fuel, steam, and air, as the catalysts contain active platinum which, as mentioned above, is active in autothermal reforming. (For instance see US4755498.) Therefore, the catalysts are capable of such a reaction, and thus meet the structural limitations of the claim. It should be noted that the manner of operating a device does not differentiate apparatus claims from prior art, as long as the structural implications are met. See MPEP 2114. Also, the phrase in the preamble "for converting a mixture of fuel, steam, and air to a hydrogen containing reformat" is intended use which only limits the claim in terms of structural differences implied, which are met as explained above. See MPEP 2111.02.

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In regard to claim 4, Madgavkar teaches both catalyst portions comprising a mixture of a low-lightoff temperature catalyst platinum and a high-lightoff temperature catalyst, mullite, (see Example 5) wherein the first portion has a higher percentage of the low-lightoff temperature catalyst (platinum) than the second portion as discussed above.

Claims 1, 3, and 5-8 rejected under 35 U.S.C. 102(b) as being anticipated by Le Gal '737.

In regard to claims 1, 3, and 5-8, Le Gal teaches a catalyst system comprising two catalyst portions (monoliths; See Figures) the first monolith containing palladium oxide (see column 4, lines 40-47) having a lightoff temperature of  $\sim 700^{\circ}\text{C}$  and the second monolith having a hexa-aluminate catalyst which has a self ignition (lightoff) temperature of  $1000^{\circ}\text{C}$  (a  $300^{\circ}\text{C}$  difference). The lightoff temperatures represent a lightoff temperature in a mixture of fuel, air and steam because the process of Le Gal teaches combustion in air which necessarily produces steam. See column 5, lines 44-58. Le Gal teaches the two monoliths in the same housing. See Figures.

The catalyst of Le Gal is considered to be an autothermal reforming catalyst because the catalyst of Le Gal would be active in autothermal reforming as it contains active palladium and other active catalyst components. Also, the first and second catalysts meet the structural implications of the limitation that the catalysts promote autothermal reforming of an appropriate reactant mixture of fuel, steam, and air, as the catalysts contain the components mentioned above. (For instance see US4755498.)

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Therefore, the catalysts meet the structural limitations of the claim. It should be noted that the manner of operating a device does not differentiate apparatus claims from prior art, as long as the structural implications are met. See MPEP 2114. The limitation that the catalyst system comprise a reactant mixture comprising fuel, air, and steam does not impart patentability as "expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of an apparatus claim." See MPEP 2115. Even so, Le Gal teaches combusting a hydrocarbon fuel in air, which produces water vapor (steam) as a product.

### ***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9 and 11-12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Madgavkar.

In regard to claim 9, Madgavkar teaches providing the catalyst system as discussed above, flowing preheated nitrogen and air over the catalyst, and introducing

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preheated hydrocarbon (and air) into the catalyst and allowing combustion to add steam and thus meets the claim limitations of passing fuel, air, and steam over the catalyst. See column 7, lines 15-21. This process comprises heating the first catalyst to the first lightoff temperature (whether or not this temperature was reached using the heat from the preheated nitrogen/air, the preheated hydrocarbon/air, or heat of combustion). Madgavkar teaches several reactions producing hydrogen in substoichiometric combustion and thus the product gas would contain hydrogen, meeting the limitation requiring a hydrogen-containing reformat. See column 3, lines 57-65.

In regard to claims 11-12, Madgavkar teaches combusting a hydrocarbon which produces and adds steam to the mixture of air and fuel, thus steam is continuously added throughout operation, including the periods after and before the first lightoff temperature has been reached.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2-3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madgavkar.

See the 102 rejection above for the limitations of claim 1.

In regard to claims 2-3, Madgavkar is silent in regard to the housing of the catalyst. However, determination of the location/configuration of a catalyst within a production apparatus is a matter of design choice and routine optimization that depends on space considerations, equipment size requirements, and other design factors and fails to produce an unexpected result.

In regard to claims 6-8, Madgavkar does not teach an example having a difference in lightoff temperatures; however, Madgavkar does teach that the concentration of the lower lightoff component (platinum) affects the lightoff temperature, see Example 4, and also teaches a difference in platinum composition between the catalyst of the first zone and that of the second that would produce a lightoff temperature difference in the broad range of the claim. See claim 1. [For instance, a difference of 0.2% platinum (a ratio of platinum in the first to the platinum in the second catalyst of 1.67) produces a 50°C difference in lightoff temperature; and Madgavkar teaches a ratio of up to 20] Overlapping ranges are *prima facie* obviousness. See MPEP 2144.05.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Le Gal.



See the 102 rejection above for the limitations of claim 1.

Le Gal fails to teach providing the catalyst portions in separate housings. However determination of the location/configuration of a catalyst within a production apparatus is a matter of design choice and routine optimization that depends on space considerations, equipment size requirements, and other design factors and fails to produce an unexpected result.

### ***Response to Arguments***

Applicant's arguments filed 3/18/2009 with respect to the rejection of claims 9 and 11-12 under 35 USC 102 as anticipated by Le Gal were persuasive, and the rejection has been withdrawn.

Applicant argues that Madgavkar does not teach or suggest a hydrogen containing reformat.

However the product claims 1-8 recite "a catalyst system for converting a mixture of fuel, steam, and air to a hydrogen-containing reformat" that is an intended use limitation which only limits the claim in terms of the structural limitations implied. See MPEP 2111.02. In this case, the catalyst must be able to convert fuel, steam and air to a hydrogen-containing reformat. The catalyst of Madgavkar is capable of such a conversion as explained in the rejection above. This is also the case in the rejection of the product claims in regard to Le Gal et al.

Applicant presents the same argument in regard to the method claims 9 and 11-12. This argument is addressed in the rejection above.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. ZIMMER whose telephone number is (571)270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ajz

/Steven Bos/  
Primary Examiner, Art Unit 1793